Earth Science®

Rockhounds' NATIONAL Magazine

MONTSERRAT IN SPAIN—See Page 11

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Editor's Memo Pad

THE MATTER OF AN INDEX—In our present issue we are exceedingly happy to be able to print, through the splendid co-operation and sponsorship of the Midwest Federation, a comprehensive index of the entire Second Series of Earth Science,—Volume VI, (1952) through Volume X, (1957). The index for Volume XI, (1958) has already been published in our December issue, and henceforth an index for each succeeding Volume will be found in the last issue of the year.

The great value of an index to any publication requires no explanation. Indeed, without such a convenience old issues are for the most part practically worthless to the scholar or research worker. How many times in the past we have remembered some splendid article which has appeared in some magazine or journal, upon something that we at the time are sorely in need of, which "for the life of us" we cannot put our hands on, and after thumbing through some several or more issues have given the job up as a bad deal.

The matter of getting information pertinent to our hobby or science into print is highly important, but to make it available for future use is also likewise important. Such difficulties may perhaps be almost entirely eliminated by a good index giving the author, title and some judicious cross-references, and thanks to Mary Cornwell we now have just such an index at the rear of this issue. Mrs. Cornwell is the wife of Earl Cornwell our advertising manager residing in Downers Grove, Illinois. The job of preparing such an index requires not only skill, but definite insight into and concerning the literature of the subject worked on. Many long tedious hours must be spent in the preparation of any index such as this, and we are all greatly indebted to her for the time and effort she has spent in our behalf.

And, while passing out bouquets, we must by all means mention Helen Allaway's untiring efforts. Wife of "Bill" Allaway our subscription manager and associate Editor, she must frequently take the brunt of many jobs large and small, mostly large, which require tremendous amounts of time and energy. Few folks sending in a single subscription or change of address, ever realize the amount of time and meticulous care which must be expended in handling the details which go along with the job of entering it and doing the book and paper work connected therewith. As editor we feel that without her untiring efforts Earth Science magazine would certainly be sunk. Hats off to the ladies of Cornwell and Allaway.

A NEW IDEA FOR MIDWEST CLUBS: Gus Brown, Promotion Chairman for the Midwest Federation, reporting for his committee at the fall meeting of the Midwest Council, commented upon the great success of their recent "Rockhound Roundup" show put on by the Des Moines Lapidary Society, October 18th and 19th. Member participation was the KEY word at the show, and practically everyone in the society took an active part in putting on the "Roundup."

This was a non-competitive show including many fine individual and club displays made by local members and visitors. Among the many other activities was a well rounded program of speakers who appeared before "standing room only crowds," and an active swap room, plus a good variety of cutting material and specimens which could be purchased at reasonable prices.

"This may be the beginning of something new in the Midwest," Brown reported, and he recommended that the Federation push the idea of having at least one good Federation sponsored show, held in the Fall, in each of the four Regional Divisions of the Federation, (i.e.;—the Northern, Southwestern, Central and Eastern), in addition to the big Annual Convention held each year in June. This would afford a great many of the affiliated Club members an opportunity to attend at least one good show a year, who might otherwise be unable, on account of vacation dates and distance, to do so.

Everyone present thought this to be a splendid suggestion, and that the frame-work for a sponsoring or a planning committee should be set up at the coming annual convention and business session of the Federation to be held next July 18th to 21st at Springfield, Ohio, for which the Miami Valley Mineral and Gem Club are to be hosts.

* * * *

COMING MIDWEST SHOW: George M. Davis, President of the Central Illinois Rockhound Society writes that their Annual Exhibit will be held at the Y.W.C.A. in Decatur, Illinois on March 21-22. Last year the show attracted more than 2500 visitors, and this year's show promises to be bigger and better. Our Midwest president LaFayette Funk is an active member and one of the founders of this fine group of Rockhounds.

* * * *

COVER PHOTO: Taken by our author Mary Cornwell—"We saw this mountain by 'funicula' from which the picture was made." Other pictures—see article, "No Duty to Pay."

CONVENTION DATES: In the past we frequently heard the question asked,—"just what good is the American Federation," or for that matter any Federation to the local club or affiliated society, anyway. Happily this question is seldom heard today, for most of us are fully aware that there are certain important functions that can better be performed by the Federation, many of which could not possibly be handled by one club acting alone on its own.

One of the services undertaken by the American Federation is the coordination of Regional Convention dates so that they do not stack up to interfere greatly with the common welfare of all concerned. Helen M. Rice, appointed by Hazen T. Perry, president of the "American," to serve as Convention Coordinator has already announced the 1959 dates, and is to be congratulated on being able to do this so early in the season, so that you may start now to make your plans to attend at least one of these great meets. They are as follows:

Rocky Mountain Federataion	April 24-26	Wichita, Kansas
Texas Federation	May 1-3	McAllen, Texas
Midwest Federation	June 18-21	Springfield, Ohio
California Federation	June 26-28	San Mateo, Calif.
Northwest Federation	Sept. 5-7	Portland, Oregon
Eastern Federation	(to be set)	Boston, Mass.

The '59 American Federation Convention will be held in the Civic Auditorium, 1520 S.W. 3rd Avenue, Portland, Oregon with the Northwest Federation serving as hosts. Mrs. Rice, Convention Manager advises that committees have already been appointed and are working on plans for many special displays, programs, field trips and a good banquet for the entertainment of visitors coming from all parts of the country.

* * * *

BOOKS ON GEMS. Our associate, Dr. J. Daniel Willems, Business Manager of EARTH SCIENCE, is a man of many facets. While surgery is his vocation, faceting gem stones is his avocation, being one of the first amateurs in America to successfully cope with the diamond. His interest in gems is deep and penetrative, and his famous book on Gem Cutting is authoritative and widely known. Furthermore, his extensive library of rare books on the subject of Gems is one of the most complete of any in America. Among his duplicates are many rare books upon the subject which are not obtainable elsewhere. These have been listed, with prices, in a new descriptive catalogue, No. 10, Fall 1958, and anyone interested in collecting rare books would do well to write Dr. Willems, P.O. Box 1515, Chicago 90, Illinois, for a copy of this neat little booklet.

* * * *

MORE LETTERS:—

Hillsboro, Oregon.

Dear sirs:—I have heard fine reports about your magazine, although I have never had the opportunity to read it,—so enclosed please find $2.00 to cover the cost of one year's subscription.

Mrs. Helen M. Rice, Vice-president.
"American Federation"

Brookfield, Illinois.

Gentlemen:—Enclosed please find check for our December ad, and may we extend our sincere thanks to those folks behind the scenes who do such a nice job in getting EARTH SCIENCE to us. We always look forward to reading the many fine articles in each issue as it comes through the mails.

May we say that we would be glad if it were possible for you to add a few more good Lapidary articles, and that we also did enjoy the "question and answer" column that you carried some years ago,—could this not also be revived in the near future.

Mrs. C. E. Thatcher,
Gem Cutters Guild of America.

* * * *

OUR AUTHORS: We are always fortunate when we are able to present an article by June Culp Zeitner, of Mission, South Dakota. She is too well known to most of our readers to require further introduction. Her articles are always informative, as well as authoritative, and her discriminating taste makes for very pleasant reading.

Harry L. Adams, retired head of the Geology Department of America's oldest Junior College (Joliet) is widely travelled and exceedingly observant. His written articles are always so accurate and detailed that anyone can easily follow the directions given.

Mary Cornwell, our advertising manager's better half, (he says three fourths), specializes in bibliographic research and spends many hours in libraries following up articles upon many Earth Science and other subjects. Last summer she spent time in Europe which gave her the inspiration for her charming article *"No Duty To Pay."*

BOOK REVIEWS

WORLD GEOGRAPHY. Otis W. Freeman, Indiana (Pennsylvania) State Teachers College, and John W. Morris, University of Oklahoma, Editors. McGraw-Hill Book Company, Inc. 1958. $10.75.

Although this book was planned as a text for college courses in geography, it is good reading for everyone willing to face the challenge of our shrinking world. Trade, so long the chief medium of communication among nations, has been supplemented in our day by the United Nations, foreign aid programs, cultural exchanges, etc. Geography is a determinative factor in the development of the peoples we are trying to know better and to live with peaceably. The authors sketch, for each geographical area, its geological, topographic, and climatic features and explain briefly their effect on the history and economy of its inhabitants.

The text is simply and clearly written by a round dozen of college and university collaborators, in addition to the editors. The dramatic impact of the book, to this reviewer, stems from its maps. Besides the more common types depicting relief, contrasting land forms, natural resources, population density, etc., novel effects are obtained by superimposing maps to show space relations. In the study of the Union of Soviet Socialist Republics, for example, no less than 10 large maps are used to delineate climatic regions, navigable waterways, railway systems, ethnic groups, comparison in size and latitude with the United States, etc. Besides maps, the text is illustrated with a generous number of well-chosen photographs E.D.C.

* * * *

ROCKHOUND'S BOOK OF VERSE:—The Rockhound's National Magazine recommends the above title book to all its many readers who may be interested in securing a copy of something very fine to put on their reading table. Delightfully and cleverly written are the many poems included in the volume, by the author Fran Schiller, Luke, Maryland, from whom the book is available, postpaid, for only $2.00 per copy.

* * * *

AGRICOLA ON METALS. Bern Dibner. A study of 16th century metallurgy based on the "De Re Metallica" of Georgius Agricola, published in 1556, and translated into English by President Herbert Hoover and Mrs. Hoover in 1912. Burndy Library, Norwalk, Conn., 1958. $2.50.

* * * *

GLOSSARY OF GEOLOGY AND RELATED SCIENCES. Cooperative project of the American Geological Institute, Washington, D.C., J. V. Howell, coordinating chairman. 1957. $6.00.

GEM HUNTERS GUIDE. 2nd edition, revised. By Russell P. MacFall. Published by Science and Mechanics Publishing Company, Chicago. 1958. 188 pp. $3.95.

Mr. MacFall knows a lot of rockhounds. The first edition of his book, in 1951, was designed to help them organize and expand their avocation. His approach was eminently practical and exhaustion of its three printings showed how well the rockhound fraternity liked it. The new edition has the same appeal. Over half of its 188 pages is an alphabetical listing of "Locations in which Gem Materials Have Been Found." We select an Arizona listing at random to illustrate:

> Arlington, Maricopa County. Chalcedony as white nodules, blue vein agate, red moss agate; S on HWY 80 to Agua Caliente road, W across tracks and 21 miles to pass at Fourth of July Peak, dig in debris on E side of pass.

Nearly every page of this section is enlivened with an intriguing road map showing mileage, mine locations, and even gates. Several hundred new locations were added in the new edition and old sites which are exhausted were dropped. Listings are also given for Alaska, Canada, and Mexico. We would like to have seen more Alaska listings.

The author leads up to his listings with a table of the characteristics by which gem stones can be recognized, illustrations of their typical crystal forms, and formations in which they normally occur. Although he advises that, generally speaking, a gem hunting trip should be looked on as recreation and not expected to return a profit, he does give current market prices for a number of cabochon materials. A glossary, an alphabetical state listing of information source material, and lists of books and magazines specializing in gemology are other useful features.

E.D.C.

* * * *

THE GREAT DIAMOND HOAX. The Great Diamond Hoax, by Asbury Harpending, with a foreword by Glen Dawson; University of Oklahoma Press, 212 pages and paper-covered board binding (a part of the Western Frontier Library). $2.00 postpaid from Office Specialties; write this magazine for address.

The Great Diamond Hoax of the early 1870's, also known as the Diamond Mine Swindle, is one of the more exotic episodes in western history. Before it was exposed as a fraud, the cleverly conceived and executed "salting" operation reportedly netted its sponsors at least $600,000 on an investment of not more than $35,000. Many of this country's

(*Continued on page* 24)

Midwest Club News

Bernice Rexin, *Club Editor*

3934 N. Sherman Blvd.,
Milwaukee 16, Wisconsin

THE MINERALORIST SOCIETY OF JOLIET, distinguished as being the oldest mineral study club west of the Allegheny Mountains, held their 25th annual Christmas party and tea on Thursday evening, December 11th, in the Geology Lecture-hall, of the Joliet Junior College, also distinguished as being the oldest Public Junior College in America.

Mr. John Kupka, local airport manager and world traveler, entertained the guests with movies and a lively narrative of his recent African Safari made principally for the purpose of bringing home big game trophies, of which he got plenty. Following the lecture the party retired to the social room where they found bounteously filled tables made even more beautiful by Christmas decorations, arranged by the ladies under the direction of past president Mrs. Albert Longnecker.

CHICAGO ROCKS AND MINERALS SOCIETY on Dec. 13 was shown slides and movies by Lorenz Aggens of his 330 mile trip through the Grand Canyon in a rubber boat. Mr. Aggens, who is a geologist and world traveler, commented that the Grand Canyon of the Colorado river is one of the greatest natural wonders of the world, and in its depths are some of the most beautiful and inaccessible reaches of our planet. Yet like all things touched by the sublime, this wondrous canyon is also touched by the treacherous. Lest its secrets and beauties be too easily found and too often sampled, the Colorado guards the way. Called the most dangerous river in the world, the great Red River of the West surges through the wild chasm it has made and challenges the adventurer to conquer its rapids and tame its power.

ST. LOUIS GEM AND MINERAL SOCIETY at its November meeting heard a charter member, Dr. Albert Frank, Professor of Geology at St. Louis University, speak on the Magnetometer, an instrument used to detect the presence of ore bodies.

At its annual Christmas banquet in December, the group was surprised with a fashion show that featured fashions for rockhounds!

CENTRAL IOWA MINERAL SOCIETY on Nov. 21 heard Jack Maloney talk on the "Crystals and How to Grow Them." Mr. Maloney also demonstrated growing silver and other crystals.

On Nov. 2 CIMS made a field trip to Pella, Iowa, to collect Mississippian age fossils, selenite and pyrite.

DES MOINES LAPIDARY SOCIETY'S Rockhound Roundup in October was literally an overwhelming success. It had planned on an attendance of up to 2000 and had over 5000. Hundreds of persons were turned away because of traffic jams. Cars were lined up three-abreast on one-lane roads. In addition to the many unusual and beautiful lapidary displays, the club presented a nine-part lecture and demonstration program, including talks by Hazen Perry, president of the American Federation, and LaFayette Funk, president of the Midwest Federation. This club is only four years old and has 75 active members. They have proved that a large membership and long experience is not needed to put on a great show.

MADISON GEOLOGICAL SOCIETY on Dec. 1 enjoyed a lecture given by Professor Lowell Laudon of the Geology Department of the University of Wisconsin. Professor Laudon, who spent the past summer exploring the interior of Alaska, spoke about the geology of the area along the Alaskan border between the Porcupine and Yukon rivers.

OZARK MOUNTAIN GEM AND MINERAL SOCIETY has compiled a book of 15 field trip areas near Springfield, Missouri. The description of each area includes a map of the region, directions for finding it, geological facts about the area, and a list of the minerals and fossils found in it. The society invites other groups to join it on its field trips.

CENTRAL MICHIGAN LAPIDARY AND MINERAL SOCIETY recently visited the Grand Rapids Plaster Company mine. This mine is in a bed of exceptionally pure gypsum and contains 60 miles of tunnel. It extends back about 7000 feet under a hill and varies between 120 to 150 feet below the surface. Although the mine has been in operation over 100 years, it still contains more gypsum than has been taken from it. Members of CML&MS were taken to the collecting areas in ore cars and were allowed to bring out all of the specimens of pencil ore and massive gypsum that they could carry. The massive gypsum can be carved and polished.

WISCONSIN GEOLOGICAL SOCIETY at its November meeting held a competitive junior gem and mineral show. Entries were judged on the basis of showmanship, quality of material, and neatness and accuracy of labeling. First prize was won by Edward Horwitz.

MINNESOTA MINERAL CLUB members wear three stars on their name-badges after three years of membership. This identification is for the purpose of helping new members who like to turn to older members for information. This we think to be an excellent idea which other Societies might well follow.

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Earth Science

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No Duty to Pay!!

by MARY G. CORNWELL

"BRING back some rocks," commanded my better half as I was packing for my trip last May. Now I am used to moving my fruit jars around in the basement to make room for rocks and to witnessing the replacement of my de Toqueville and Bryce on our book shelves by Dana, Willems, Pearl, etc. But this assignment was a threat to my status of rockhound-by-marriage-only. I accepted, however, with the result that I am now a collector. If you come to see my specimens, you will notice a box marked "Offering." I have to raise $6 to have the handle fastened back on my suitcase.

The first rocks I picked up in Europe were two which were lying in front of Windsor Castle, outside London. The feet of Eton schoolboys and perhaps of British royalty had brushed against them. Now they are living out an inglorious exile in the Cornwell basement. Next spring we'll listen for the shale to whisper to the jasper, "Oh, to be in England now that April's here!"

My next victim was a piece of iron-red sandstone near Kaiserlauten, Germany. That was on a Sunday and Germans are used to automobiles stopping along the roadside for "convenience." My little convenience is the same bright rust color as the soil in parts of northern Wisconsin and Michigan.

Nothing could be grimmer and greyer than the mica shale I picked up next along the approach to Marksburg Castle

Little Swiss Church (Gotthard Pass—El. 3060 ft.)

on the Rhine. Across the drawbridge, up and around the mountain the path wound. On the first level of the tower were the quarters for the horses, then the great storage rooms and kitchen, and then the living quarters for the Lord and Lady and their knights. Commanding the Rhine, far below, were batteries of cannon.

We crossed the Swiss Alps via St. Gothard's Pass. As we climbed up above the timber line, we passed spectacular waterfalls. Soon the only color left was in the blue sky. Everything else was white snow or black crags. Here I found my pieces of black and white granodiorite.

Ruins of the Roman Forum

I saw no rock shops comparable to ours. Once in Italy, I did see shops where marble was cut and polished. I walked into one of these one afternoon in Florence just as the force was cleaning up, preparatory to closing. Fragments of white, blue, green and pink marble had been swept into a pile on the floor. Mindful of the letter from D. D. Eisenhower, enclosed with my passport, reminding me that my conduct abroad would help to mold the reputation of my country, I tried to express friendliness, but at the same time a strong desire to pick up those marble fragments which appeared destined for the scrap heap. Incredulous stares yielded to understanding and I was freely tendered the pick of the pile.

More marble in Rome, perhaps from the chisel of Michaelangelo himself. This time from the courtyard of the Vatican. The guards took my camera from me as I entered for the papal audience, but left me clutching my dark red and grey chunks during the 45 minutes Pope Pius XII mingled with and blessed the throng in St. Peter's. The facade of this largest of all churches is travertine which has mellowed to a soft golden color.

They were repairing the cathedral in Barcelona the morning I was there. The workmen let me pick up a piece of grey sandstone from a pile they were using. The beginnings of this venerable building go back to the 4th century, but I suppose the cementing of the sand grains in my piece took place long before that.

Forty miles from Barcelona is the Mountain of Montserrat, i.e., sawed mountain. Its highest point, San Jeronimo, may be reached by "funicula." As to how this mountain happened to rise from the neighboring plains of Catalonia, I quote Jose Maria de Sagarra, student of the region:

"They (the geologists) will tell you that these enormous blocks are formed of stones held together by a natural calcare ous-clayey cement of extraordinary resistance. And they will also tell you that such formation was originally developed at the bottom of the sea, when at the beginning of the Tertiary epoch a violent contraction of the Earth threw up a continent from the Mediterranean. Then the waters, which in previous ages had invaded all the central part of Catalonia, became a vast lagoon bound by enormous crags. The space on which the Mountain of Montserrat now stands remained submerged under the waters, till a later convulsion sank the Balearic continent, of which only the isles we know remained. The repercussion of the geogenic phenomenon in our country cracked and shaped the land in an amazing way, pushing the waters of the lagoon towards the sea. When the vast cavity had drained and dried, a humid and amorphous Mountain of Montserrat appeared in open view. Soon the sun and the winds split tempestuously with cosmic brutality that soft and colossal mass, forming what you now see; these elephantine bulks and these extraordinary and monstrous pipes of a marvellous organ."

A good sized specimen I picked up near the top of San Jeronimo is a conglomerate of many types of rock in a calcium carbonate matrix.

France is represented in my collection by pieces of chert from the walk leading to the tomb of Napoleon in Paris. The tomb itself was carved from dark red porphyry. The grounds around Versailles yielded flint, and a piece of glass which my analysts, Earl Cornwell and Bill Allaway, identified as part of a champagne bottle, vintage of 1896.

Some "rocks" I brought home only in memory, like the malachite table tops in the Pitti Palace in Florence, the Elgin marbles in the British Museum, and the Louvre's incomparable Venus de Milo.

SOLILOQUY

"The Old Rockhound"

By **SIGRID ANDERSON**

ONCE again alone, but not lonely, the Old Rockhound tramps through the still, fragrant woods, the melodious song of hidden Hermit thrush the only sound, as the aged rockhound cautiously follows the winding path, leading to the old fluorite mine. Gradually it grows steeper, but determinedly he trudges on, past formidably looking boulders and dark caverns, finally reaching the mine, an awesome, seemingly bottomless hole dropping into the heart of the mountain.

The breath-taking sight of green, glittering fluorite around the rim of the abandoned mine meets his astonished gaze and exultingly he scoops up the clearest and greenest crystals, stuffing his pockets. Not enough! Exhausted, he sits down on the moss covered slope, wondering how to get it all home with him. An old water pail laying under a bush gets him scrambling to his feet and methodically he fills it with only the best, realizing the impossibility of getting it *ALL* home.

With the pail brimming over and his pockets full he starts his triumphant descent, carefully treading his way over loose stones, afraid to lose even the smallest of his precious find. At last he reaches even ground and then tries to hurry, as the sun already has gone down, but the load is growing heavier and he must use his entire will power to resist the temptation to sit down and rest.

An ominous stillness is all around, not

(*Continued on Next Page*)

Our Cover Photo:

This peak is not a part of a mountain range, but one that rises abruptly from the plains within 40 miles of Barcelona, Spain. By means of a "lift," visitors may travel to a point near the top to get a good view of the Montserrat Monastery and the surrounding countryside.

even the chirping of a bird, only dark shadows closing in. The path seems endless and a morbid fear keeps recurring, that he will never get home. What was it he had read in the newspaper last night? Oh yes,—a janitor, who had a bad heart. The house took fire and hurrying to knock on everybody's doors to rouse them, he then dropped dead. A hero! Well, anyway, *HE* has not got a bad heart, so he should worry. That log in the grass looks wonderful, but no time to rest, must get home before dark.

Something starts hurting in his chest, —funny place to hurt. He tries to recall similar pains, while still hurrying on, but this seems to be different. Suddenly, a knife-like stab in the chest halts him,— the knife it almost seems is turning around, and in agony he starkly realizes he may die out here in the lonely woods, far from home. Still clutching his hard won, precious burden he stumbles blindly on, the pain becoming unbearable. Darkness engulfs him,—but he hears someone near, forcing him to drink something burning.

Awakening he finds himself in his bed at home, surrounded by anxious relatives, a glum-looking doctor with a stethoscope and his green, glittering fluorite.

"You paid too high a price for these!"

"No, Doctor, they are worth it," with a broad, contented smile.

Book Reviews

THE Book of Mineral Photographs. Author and publisher is Dr. B. M. Shaub, Associate Professor of Mineralogy and Petrography, Smith College, Northampton, Mass. 1957. $1.68 postpaid.

The book is a collection of 110 black and white photographs of mineral specimens, usually in the form of fine crystals. The photographs are large enough, 6" x 7" plates, to show detail in gratifying degree. Readers who have found ordinary illustrations of minerals in text books and magazine articles too small to be enlightening will be highly pleased with these revealing pictures. Under each the author has appended the name, chemical composition, source of the specimen shown, magnification where applicable, and a few interesting facts about the mineral itself. There is no apparent attempt at classification but the photographs are well indexed.

Besides the more common minerals such as quartz, pyrite, etc., the subjects include plant-like formations of dendritic pyrolusite, aragonite (Floss ferri), descloizite, variscite, anthodites (cave flowers), the fibrous lattice crystals of cerussite, a volcanic bomb, and a collection of pisolites from the bottom of Great Salt Lake.

E.D.C.

MINERAL COMMODITIES OF CALIFORNIA. Bulletin 176, Division of Mines, Department of Natural Resources, San Francisco. 1957. $7.50.

IN MEMORIAM

Charles Crosswhite started on his journey to the shining sea November 2, 1958. He was a charter member of our club, a former president and was greatly admired, respected and loved by everyone who knew him. Many of us owe our knowledge of minerals to Charley, he was never too busy to answer our questions or help us in any way he could. His passing is a great loss to his family, to our club, to our community and to all the multitude of friends who knew him. But the memory of his fine qualities and his wonderful friendship will live on. We extend our sincerest sympathy to Coline.

IF I SHOULD GO

If I should go before you do
Do not grieve for me.
For it will take me a long time
To reach the shining sea
I shall tarry on the way
And pick up every stone
Select the best, discard the rest
On that long journey home.
And by the time I've filled my sack
You will catch up with me,
And hand in hand we'll journey on
Good deeds, our gems will be.
When God, the Master Rockhound,
High grades what we have stacked,
May he find enough gem quality
To put us in his sack.

Maude Barns

(Poem *"If I Should Go"* reprinted from "Rock Lore" bulletin of St. Louis Mineral and Gem Society.)

New Address: Mrs. Colin Crosswhite, 2501 Van Brunt, Apt. 5, Kansas City, Mo.

Historic Idar-Oberstein

by HAZEN PERRY*

IT IS difficult for the thousands of lapidaries in this country to conceive of a city of 25,000 people together with the adjoining villages and hamlets all engaged in cutting and polishing agate and gem stones and fashioning beautiful jewelry. What a thrilling experience it would be to wander along the crooked streets of this picturesque quaint old city and examine the product of centuries of experience and skill in the lapidary field.

Practically everyone in the rockhound fraternity has heard about Idar-Oberstein and seen pictures of craftsmen lying flat on their chests while grinding a stone on an enormous wheel turned by water power. The average European tourist, however, seldom visits this community as it is tucked in the steep valleys of the Nahe and Idar rivers just 10 miles east of the Luxemburg border, somewhat off the beaten path. A visitor now would find that factories have been modernized and but little trace remains of the primitive old fashioned equipment. It is here that the art of cutting and polishing of gem stones has passed through all phases and has flourished for generations attracting craftsmen from all of Europe.

Historically this is a very old community dating back prior to the settlements of the Celts. Later the Romans occupied the country and ruins of their castles and fortifications still remain scattered through the forests on the rocky hillsides. Large deposits of agate existed on Gibbert mountain and old records and invoices indicate that quantities of agate were being dug, worked, and sold as early as 1454. The first Guild Order for Cutters was formed in 1609. Later, in 1715, a Guild Order for Agate Borers was formed followed, in 1745, by a Guild for Goldsmiths. Business flourished and a sales

*Writing in the February 1958 issue of Rock Rustler's News, Bulletin of the Minnesota Mineral Club.

WORKSHOP, WORKMEN and THEIR PRODUCT: Idar-Oberstein should be a must for every American-European tourist with lapidary interest.

organization known as the Idar-Oberstein Industries made its appearance displaying jewelry and gems at fairs throughout Europe and the Near East. The resulting increased volume of business soon depleted the local supply of agate and further growth was temporarily retarded for a while until 1828 when agate was discovered in Brazil. Huge shiploads of Brazil agates soon began pouring into the community giving it new life. New cutting and polishing mills started up and old ones were modernized.

Craftsmen specializing in sapphire, topaz, beryl, and other precious stones were attracted to the community from centers such as Antwerp and Paris. In 1886 the first diamond mill was established. By 1940 some 4000 individuals were employed in the Idar-Oberstein economic area as diamond cutters. To round out the jewelry business, other firms making watch chains, clasps, buckles, powder boxes, cigarette cases, and other ornaments settled here.

Idar-Oberstein today is a flourishing center of the lapidary and jewelry arts. Distribution of their products is world wide. Latest figures show 460 agate cutting mills, 480 semi-precious jewel cutting mills, 220 diamond cutting mills, 150 agate borers, 100 jewelry engravers and 200 firms dealing in genuine jewelry and 120 more in artificial or costume jewelry with other firms making metal fancy goods.

A circular from the local Chamber of Commerce has this to say—"The Idar-Oberstein area offers a picture without comparison. The rocks mount steeply from the river banks and the observer looks against the masses of the rising wall, fully aware of his own smallness. In the middle of the masses of stones a Chapel has been built into the cliff. No building on earth could stand on such a marvelous spot. The overhanging rocks are crowned with ruins, the walls of which look back over a thousand years. The town itself built along the winding banks of the river—the ancient agate cutting and modern diamond plants—the low ceiling goldsmith rooms and the tall modern jewelry buildings all mixed together. The Trade Hall where you are shown all of the types of jewels to be found in the world and other beautiful creations made here and kept in the Native Museum. He who has once visited Idar-Oberstein will forever long to return."

When Was Gold Discovered in California?

by JUDSON A. BAKER

THIS, perhaps, may become a much mooted question. Popular history has it that "gold was first discovered in California on January 24th, 1848, at Coloma, by James W. Marshall." The California Department of Natural Resources, is the authority for this statement.

In any event this discovery of gold precipitated the gold rush of the "forty-niners" and people from all over the world flocked into the territory. Over 260,000 had arrived within a period of twelve years.

Historical research, however reveals, that this was not actually the date or the place of the earliest discovery of this precious metal within the GOLDEN STATE, as there are other citations of its discovery in California earlier than that of Marshall's—for instance at a spot near Los Angeles, i.e., Placeritas Canyon, the "Oak of the Golden Dream."

This knowledge inspired me to do some further research, and I found that despite the historic marker at and near Placeritas Canyon, which is now a State Park, even the Placeritas Canyon discovery might not have been the first in California.

Incidentally, the Placeritas Canyon discovery was by one Francisco Lopez, who

on March 9, 1842, stopped to rest beneath an oak tree in the canyon. He pulled a handful of wild onions and found gold in the dirt clinging to the roots. He worked the mine with one Charles Barec, and some early accounts improperly describe the site as San Francisquito Canyon, which is nearby.

In certain writings, Sir Francis Drake is reported to have mentioned the probability of gold in California as early as 1579. The basis for his surmise has not been discovered, and there is some evidence his speculation may have been "wishful thinking," but in any event there was considerable of this type of speculation prior to 1848.

Placers were reported worked near San Diego in 1825, after a man named Jameson reported "on the coast of California there is a plain of 14 leagues in extent, covered with an alluvial deposit, in which lumps of gold are dispersed."

Gold also was reported in California in 1818 by Teschemacher, and there is a record that "a small thread of gold was worked in the Santa Barbara district" in 1840.

But the report of Francisco Lopez and his Placeritas Canyon discovery of March 9, 1842, is considerably documented and unquestioned.

However, rather surprisingly, the reports of the Francisco Lopez discovery, and others apparently around 1828 in the Mono area east of the high Sierras, apparently caused little stir, even though they were duly publicized in the San Francisco, and perhaps other, newspapers.

Accounts of the Marshall discovery vary. Most accounts agree, however, that the discovery was in January or February, 1848. Several accounts give the date as January 19, 1848, but the first published notice was March 15, 1848, in which the date was given as January 24.

Others reported discoveries in the San Joaquin Valley, near Stockton, in 1846, and there was news of "abundant" gold near San Diego in August, 1847.

Earlier references to gold in California are contained in a Spanish history of California printed in Spain in 1690.

In any event, this investigation has been an interesting and profitable experience, and one which I feel probably may eventually bring about a revision of our ideas and dates pertaining to the very important historical occasion. How very difficult it frequently is for people with ever the best intentions to actually "keep history straight."

* * * *

"What rings of Eastern prince his
fingers hold,
Gold decks the fingers,
beryl decks the gold."

Parnell

* * * *

"Kindled once it no extinctions knows
But with eternal flame increasing glows.
Hence with good cause the Greeks
Asbestos name
Because once kindled naught
can quench the flame."

Marbodus

* * * *

Take Time . . .

Take Time TO THINK . . .
It is the source of power.
Take Time TO PLAY . . .
It is the secret of perpetual youth.
Take Time to READ . . .
It is the fountain of wisdom.
Take Time TO PRAY . . .
It is the greatest power on earth.
Take Time TO LOVE and
BE LOVED . . .
It is a God-given privilege.
Take Time TO BE FRIENDLY . . .
It is the road to happiness.
Take Time TO LAUGH . . .
It is the music of the soul.
Take Time TO WORK . . .
It is the price of success.
Take Time TO RENEW
Your Subscription to
EARTH SCIENCE—you will not wish
to miss a single issue.
DO IT NOW!!

Small Sphere Cutting

By HARRY L. ADAMS

WHAT rockhound hasn't thrilled at the sight of a beautiful banded agate marble and wished he could own at least one? In the late 1800's and early 1900's most real marble players had a few "aggies" and some of the more "sporty" fellows even played "for keeps" with their beautiful "canicks" from Oberstein, Germany. Workmen there broke the stone into small pieces, chipped them nearly round with hammers and then ground them round against emery wheels and polished them. The less reckless boys used them only for "shooters" since they were expensive. They probably cost around twenty-five cents. Now, in some of the shops they sell for three or more dollars each when you can find them.

The first marbles were actually made from marble, hence the name "marbles." A factory in Saxony turned out quantities of marbles made from a hard limestone and a plant at Akron, Ohio, made many natural onyx marbles. An Ohio pottery has turned out over one hundred thousand ceramic marbles daily. These "marbles" are made of clay baked and glazed like earthernware. "Chinc" marbles are made of porcelain clay. Glass is used to imitate the old agate (banded chalcedony) marbles but break much more easily. They are made either by pressing molten glass into iron molds or by gathering a small globule, sometimes enclosing small figures, of molten glass on the end of a short rod and whirling it until cool having assumed a spherical shape.

Millions of very good looking glass marbles also are now being manufactured for the "five and dime" trade by machines where globs of variously colored molten glass is automatically dropped into semicircular groves spirally arranged upon the surface of revolving steel cylinders. The molten glass is dropped at one end of the pairs of cylinders arranged horizontally like a wringer, and falls out into kegs at the far end a finished marble. At least one such factory is in operation and may be visited at Ottawa, Illinois. However, no other marbles compare in beauty with some of the agate marbles, and besides their beauty they are durable. It is possible, of course, to break them but usually nothing more serious results from a hard blow than a "moon" fracture that stays in place.

The basic procedure in making stone spheres is the same as with any other lapidary work; cutting or breaking the "blank," rough grinding, fine grinding, sanding or real fine grinding, and polishing. The exact technique, of course, has to be adapted to secure perfect spheres. The same techniques could be used for grinding a "crystal gazing" ball, marbles, or beads and the process and equipment would vary only with the dimensions of the stones to be cut. The process is easily used to cut "star" stones as the two stones cut at the same time need only be sawed apart at an easily seen place, guaranteeing proper orientation, midway between the two star centers. A number of years ago a factory in Dyersville, Iowa, imported some very nice cave calcite onyx from New Mexico and started making spherical gear shift knobs for automobiles. Many thousands were made here, and later the shop was moved to Dubuque, Iowa. Cheaper glass knobs soon gave them too much competition and then plastic materials took over the producing of such items, and the plant went out of business.

In Germany the workmen break the stones into nearly cubical pieces. Corners are ground off and around a hundred pieces are placed on a millstone surface which has been provided with a number of grooves. A second millstone of hard

wood (oak) is let down upon the stones to be cut. By causing the millstones to whirl rapidly the modified cubes are rolled and rounded and polished quickly into marbles. A current of water is fed through the middle of the wooden mill, which carries away the dust as fast as it is ground off and also cools the mill and prevents undue heating.

For larger specimens, and where there is no desire for exact sameness in size, the now popular sphere cutting techniques of using tubes of brass or wrought iron, can be used. As the size of the material used gets smaller, as in the case of marbles and beads, this procedure becomes progressively more difficult, and for the amateur hobbyist quantity production of spheres of a given size the process is not practical. The cutting of larger spheres is one of the simplest of lapidary procedures when the tubes are used, and this method has been so frequently explained in books and magazines that it will not be covered here. Mr. Russell Kent of Hepburn, Iowa, has done a superb job of cutting a beautiful Brazilian agate sphere of surprisingly perfect dimensions. It has a diameter of five and two one-hundredths inches and weighs six pounds four and one-half ounces. He did this excellent job by hand grinding, keeping a constant check on it with the micrometer.

Equipment in common use for tube grinding of larger spheres is shown in accompanying drawing. (Fig. 1.)

Briefly, the idea is to hold the loose pipe by hand, guiding the stone, while the "live" tube is power rotated. It carries most of the abrasive grit paste. Course grit (100) should be used at the start with larger stones. With smaller stones finer grit (220) can be used at first. It is more economical to start by sawing the material into cubes, then chip them to obtain a piece a little larger than wanted as you would with a cabachon. Then when nearly round, use the tubes and continue until the sphere is satisfactorily "cut." Practice and experimentation help one to find the best procedure according to his equipment and skill. The tubes should be a little smaller than the desired sphere.

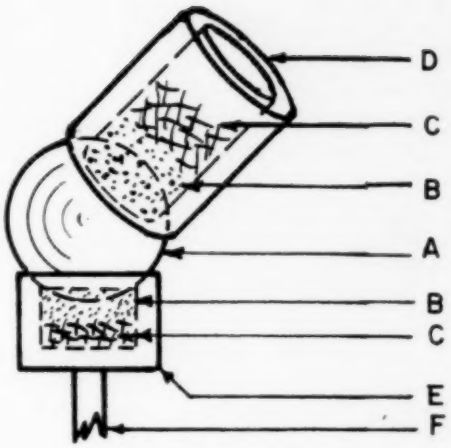


Figure 1

A. Sphere being cut.
B. Cutting grit used to cut the stone as it rotates.
C. Paper or rags used to keep the grit in contact with the stone.
D. Tube held in the hand and used more or less to guide the stone.
E. "Live" tube rotated by shaft "F" from the source of power.

Cutting numerous spheres of the same size can best be done by adopting the Oberstein technique. A drill press can be used as in figure 2. The springs under the floating lap supply the pressure, not too much, which can also be influenced by adjusting the height of the drill press shaft which should be locked in the proper position. The "live" lap should not be raised while it is running or the motion of the stones may destroy some of them when they leave the groove, as shown in Figure 2.

Occasionally stop the rotation and scrape the grit back into the grooves. One or more grooves may be machined into the floating lap pan but it should be remembered that the outer one rotates faster so will cut faster than the inner one.

Another method is to use the same type of cutting parts but differently attached, if you do not have a drill press, as shown in figure 3.

Start by sawing cubes a little larger that the desired spheres, as you would in cutting cabachons. Continue to grind off corners until you have many faceted spheroids as nearly round as you can make them freehand. Use care not to grind inside the intended surface of the desired sphere. Then place as many nearly round pieces as you can (always process more pieces than you want in each batch) in the grooves of the lap pan with the grit mixture paste. Do as you would if you were mixing the grit paste for ordinary lapping. Completely wash everything that you use when changing grit. From fifteen to sixty minutes, according to the size of the material and its hardness, should be enough but keep up your usual amount of "inspection" as the work progresses. Use care in rough grinding so the spheres will all be as near the same size as possible. In the case of beads it is most important to start with more pieces than are desired as it is difficult to grind different batches to match. With beads, very small "flats" may be the location for the drill holes as they would be more difficult to notice in that position. Run the "live" lap from five hundred to one thousand r.p.m.'s for a six to eight inch lap.

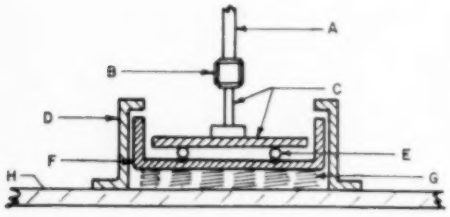


Figure 2

A. Drill press shaft supplying "live" power.
B. Drill press chuck.
C. "Live" shaft and lap of cast iron or hard wood.
D. Guide for the floating lap made in a machine shop as a two-flanged pan. (Several brackets spaced around it may do the job.)
E. Spheres being cut.
F. Cast iron floating lap pan six or eight inches in diameter. (This can be made by a foundry or machine shop. One or more circular grooves of larger arc than the diameter of the largest spheres to be cut are machined in the bottom.
G. As many springs, all the same size as can be put under the floating lap pan without interfering with each other's function. They should be fastened to the supporting surface H.

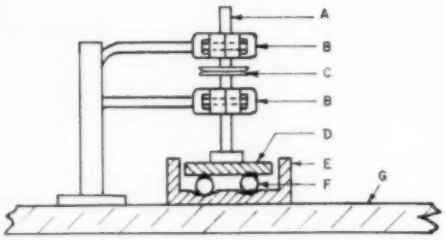


Figure 3

A. "Live" shaft free to move up or down.
B. Bearings firmly attached to their supporting brackets, in turn firmly attached to the table too.
C. Drive pulley.
D. Floating "live" lap wheel of cast iron or hard wood. If wood is used there needs to be a weight or spring arrangement to press down on the "live" lap shaft.
E. Cast iron lap pan. Stationary and made in a foundry and machine shop with one or more grooves as in figure 2. Grooves are of a larger arc than the diameter of the spheres to be cut.
F. Spheres being cut.
G. Sturdily built table top or other foundation for the equipment.

Final polish can be obtained by using special pans with working surfaces and grooves of felt or hard wood together with your favorite polishing agent. If spheres are not too small they may be given the final polish by holding them in the hand or by dopping (frequent turning and redopping is required) and using the agents you usually get best results with.

"The bloodie shafts of Cupid's war
With amatists they headed are."
Sir Philip Sidney "Arcadia"

Vertebrate Fossils of Mission, South Dakota

By JUNE CULP ZEITNER

FOR many years the alluvial sand and gravel deposits of the area near Mission, South Dakota on the Rosebud Indian Reservation have attracted attention of paleontologists from many parts of the world. Our area abounds in vertebrate fossils of many species and eras and many are exceptionally well preserved.

Whenever the State opens a new sand or gravel pit for the purpose of road construction some member of the Zeitner family is around to spy on some former inhabitants of our country.

In the last few years the South Dakota School of Mines has done extensive prospecting here under the leadership of Dr. J. R. Macdonald. Many new species were identified and Dr. Macdonald is writing a scientific paper on fossil fauna of Mission.

However, I am not a trained paleontologist, simply an amateur devotee of all the Earth Sciences. I don't know the long involved details of the history of Mission fossils, but I have studied some of the commoner former residents of our area, and am intrigued by imaginings of what our homeland must have looked like in ages past.

This was a land of the rhinoceros, the camel, the elephant. A land of high humidity and exotic tropical vegitation. The remote ancestors of beavers, deer, antelope, dogs, and pigs were also natives of this area.

As fossil teeth are one of the best ways of determining species as well as being harder and more complete than many other fossil remains we have picked up an unusual assortment of teeth. Some are single, some in pieces of jaw bone and sometimes we find the complete jaw.

Not only do these teeth tell the paleontologist the name of the animal, but trained eyes can tell by the teeth the approximate age of the animal, what kind of food he ate, and other vital information.

Probably early elephant-like animals are the fossils most often brought to our attention from local deposits. The reason for this is that their giant size makes them easier for the men working at the pit to see and stop the machinery from crushing the fossil.

We find remains of both the Mastodon of the Pliocene and the Mammoth of the Pleistocene. Teeth up to 12" long, tusks up to 56" and femurs up to 28" long are not uncommon.

One type of these elephant-like residents was the Gompotherium or long jawed Mastodon. It was a four tusked animal, having two short, sharp, straight tusks for rooting as well as two long curved tusks. We have the lower jaw of such an animal measuring 54".

Well preserved pieces of the fossil ivory, often with dendritic patterns is the only Gem material found near Mission except the coal black opalized wood.

Another common fossil here is the Oreodon. Originating in the Eocene and becoming extinct during the Pliocene, this animal was in some respects like a ruminant (cud-chewer), and in other ways like a pachyderm (thick skinned animal). The skeleton resembles a pig, but the teeth are more like a cow's. It had four highly developed tusk-like canine teeth.

The king of local beasts at one time was the Titanothothere. The size of this beast was about like the present day elephant, but its appearance was more like a rhinoceros. Its skull is distinguished by bony nasal protuberances projecting upward and outward much like misshapen horns.

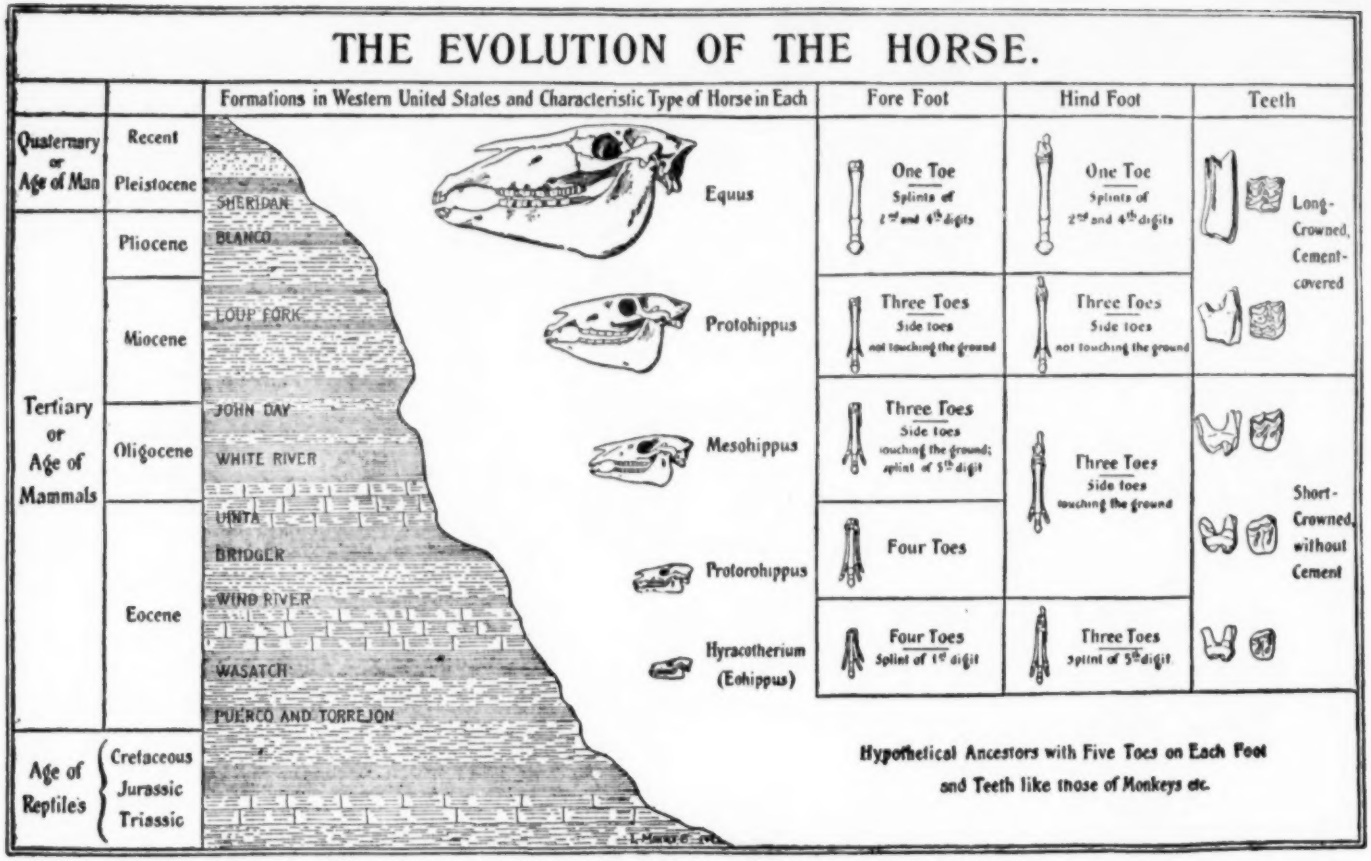


Figure 48—The successive changes in the development of the Horse, arrayed stratigraphically. Matthew, 1905.

Two groups in particular however capture the imagination of the amateur student of paleontology of this area. These are the *horses* and the *camels*. Both present quite long complete family histories and were the ancestors of modern domestic animals.

Back in 1916 a paleontologist named Troxell discovered in the White River Beds near Mission, the bones of the earliest one-toed horse, pliohippus lullianus. From that day on Mission became a mecca for those who have sought to trace the interesting evolution of the modern horse. For time has revealed that not only Pliohippus but his forebears of the oligocene some 39,000,000 years ago flourished, died, and were preserved in the Mission area.

Of all the many fossil bones of the White River Badlands perhaps the horse has awakened the most interest. The first horse Hyracotherium was perhaps the size of a small dog. This ancestor of all horses lived nearly 60,000,000 years ago, and inhabited a tropical area.

One of the most interesting things concerning the history of the horse is that although modern horses are all descended from Old World horses, America or the New World is the original and oldest habitat of the horse. It was not until the end of the Pleistocene that the horse disappeared from the lands he had lived in for some 55,000,000 years. The wild horses found in the American west in pioneer times are descended from horses lost by early Spanish colonists.

The Eocene horse had four toes on his front feet and three on his hind feet. Most of the horses which are found in fossil form in the badlands are of the three toed variety.

Evolution of the horse is traced through the teeth as well as through the foot bones and other skeletal remains. The Eocene horse had short crowned teeth; Miocene horses had longer crowned teeth; Pilocene horses had large long crowned teeth and the Pleistocene even larger.

Pliohippus, the earliest one toed horse, has been found in the Mission vicinity since 1874. A friend of ours vividly remembers that when he was ranching in the Haystack Butte area in 1916 almost a complete skeleton of a pliohippus colt was unearthed by an excited "Eastern Professor" camping at the ranch.

Beginning with Mesohippus the horse family was divided in two groups, the forest dwellers and the plains dwellers. We find many remains of the oligocene Mesohippus in our sand and gravel deposits. The adult animal was a slender legged creature 18 inches high, not as large as a full grown coyote. The back was arched and the hind limbs quite a little longer than the forelimbs. The skull was about 7 inches long.

Neohipparion is the name of still another kind of horse which evidence shows once roamed this area. This was a much larger horse, being about three feet to three and a half feet high and gracefully proportioned like a deer.

Neohipparion, however, for some reason disappeared, as did Hypohippus, the forest horse. Protohippus was the direct ancestor of Pliohippus which in turn was the ancestor of equus, the modern horse.

Although the camel is thought of today as an African or Asian beast, he is really a native of North America. During the Eocene epoch about 60,000,000 years ago ancestral camels roamed what is now western United States.

The first camel, Protylopus was not much bigger than a jack rabbit. The Oligocene camel, Poebrotherium is the earliest camel of which we have evidence in our area. Several kinds of ancestral camels were almost as tall as giraffes. Procamelus, a graceful llama-like camel, of the Miocene, is the most common fossil camel of local fossil beds.

The intriguing mystery about the camel family is why did the camel survive only in the old world, and its near cousin, the llama, survive only in South America, while neither survived in their ancient home North America?

(*Concluded on page 24*)

THE METAMORPHIC MINERALS OF FRANKLIN, NEW JERSEY

By JOHN S. ALBANESE

METAMORPHISM is the alteration (or changing) of existing rocks invaded by high temperature silicate solutions forced upward by high pressures from deep seated igneous sources. Heat, pressure and gases (vapors) are the requisites for metamorphism. Liquid solutions, gases, volatiles and superheated steam escape through the cracks in the existing rocks. These elements combine with those of the invaded rocks to form new minerals, known as hydrothermal minerals. When volatiles such as sulfur, boron, arsenic, chlorine condense and crystallize in the cracks or cavities of the existing rocks, this phase of metamorphism is called pneumatolitic, or rather *was called*. The modern usage of the term hydrothermal also includes the pneumatolitic phase of crystallization.

Rocks undergoing metamorphism may be igneous, sedimentary or already metamorphosed rocks. When subjected to heat, pressure and high temperature solutions, or gases, the invaded rocks lose their original texture and chemical composition. Different rocks have different susceptibilities to metamorphism. Of all the rocks, impure limestones yield the greatest array of new minerals.

When a mass of impure limestone (calcium carbonate) with impurities such as dolomite (calcium-magnesium carbonate); quartz (silica dioxide); clay (hydrous aluminum silicate); iron oxide and carbonaceous matter derived from organic sources is invaded by high temperature solutions, the elements in the limestone combine with those in the hot solutions to form new chemical compounds. For example, the lime (Calcium oxide) in the limestone may combine with the silica in the hot solutions to form the calcium silicate Wollastonite (CaSiO). Wollastonite usually forms at temperature of about 1125 degrees Centigrade, (or about 2057 degrees Fahrenheit). Dolomite, quartz and water may combine to form Tremolite (calcium-magnesium silicate). If iron is present in the limestone and replaces the magnesium, the tremolite may grade into actinolite.

Metamorphosed limestones usually contain abundant garnet. This is because the aluminum oxide in the clay (as impurity) combines with calcium and silica to form the lime-aluminum garnet grossularite. If iron is present, the lime and iron may combine with silica to form the lime-iron garnet andradite. The carbonaceous matter in the limestone may form graphite, which is pure carbon.

The most prolific producer of metamorphic minerals is the limestone body at Franklin, New Jersey, and adjacent area. Here the rocks of the area comprise limestone, gneiss (metamorphosed granite) and pegmatite, all of pre-Cambrian age. The ore body consists of franklinite, an oxide of iron, zinc and manganese; willemite, a silicate of zinc and zincite, an oxide of zinc. These three minerals, chiefly in granular form, are intermixed in crystalline calcite, which forms the gangue of the ore. All are wholly enclosed in metamorphosed limestone. The genesis of the ore and the process, or processes, by which they were formed, have been subjects of interested study and speculation by eminent geologists. That they were formed under peculiar and unusual conditions is generally agreed.

Several conflicting hypotheses regarding the origin of these ores have been advanced. The one generally accepted is by the late Dr. Charles Palache, of Harvard University. According to Dr. Palache, the original ores were formed by metasomatic emplacement (the deposition of new minerals replacing or substituting for one or more earlier formed minerals) in pre-Cambrian time, probably the result of alteration and oxidation of pre-existing zinc sulfides. These altered, or oxidized sulfides, enclosed in the limestone, underwent regional metamorphism over a considerable period of time—in fact, several millions of years, with the result that the entire body was crystallized and recrystallized over and over again. Igneous solutions were introduced long after the original ore body was recrystallized, as is evidenced by pegmatites (coarse granite), contact zones and numerous dikes within the ore body.

In the writers collection are many hand specimens showing cracks filled with igneous material within the limestone, and many specimens show faults and slickensides of the recrystallized products, such as rhodonite, willemite, franklinite, garnet, etc. Also in the writers collection are many specimens of massive or granular willemite showing a criss-cross pattern of microscopic veinlets of secondary willemite. These minute veinlets clearly show that willemite solutions filling these veinlets were highly fluid and were injected under conditions of extremely high pressures and high temperatures. The Franklin, N. J. mineral collector may observe some of these willemite veinlets under the fluorescent lamp. They are too minute to be seen with the naked eye. These veinlets of willemite in previously formed massive willemite prove that igneous activity took place later than the regional metamorphism which altered the primeval sulfides into franklinite, willemite and zincite.

As a result of this later igneous (or hydro-

thermal) activity after the regional metamorphism of the original ore body, about 200 mineral species and varieties have been identified and described, and scores of other hand specimens await identification. It is the writer's humble opinion that ere the final chapter on Franklin, N. J. minerals is written, there will be listed some three hundred species and subspecies. New species are constantly being discovered from specimens collected long ago and which have reposed in collections for a few decades. A supposed psilomelane specimen, labeled "Franklin Furnace, N. J." and which lay undisturbed for over 25 years in a collection, was found to be a new species from an X-ray diffraction pattern of its powder. Although its physical properties were similar to psilomelane, its atomic structure was not, as revealed by its X-ray pattern. This new species was called Woodruffite. Many other new Franklin species have been discovered in a similar manner since Dr. Palache's classic was written.

There are 92 naturally occuring elements, and of these, about 30 are said to be common. The elements found at Franklin, N. J. in the metamorphosed limestone and the surrounding igneous rocks are as follows:

Aluminum	Manganese
Arsenic	Nickel
Barium	Phosphorus
Beryllium	Potassium
Boron	Silicon
Cadmium	Silver
Chlorine	Sodium
Chromium	Strontium
Cobalt	Sulfur
Copper	Thorium
Fluorine	Titanium
Iron	Vanadium
Lead	Zinc
Magnesium	Zirconium

If we include carbon, calcium, hydrogen, oxygen and the elements cerium and lanthanum, the latter two found as oxides in the mineral allanite, the total number of elements discovered so far at Franklin, N. J. is 34, or little more than one-third of all known naturally occurring elements, a score of which are so rare most people are not acquainted with them. Of all the mineral deposits on earth, none can boast such an assemblage of elements and mineral species. As only willemite, zincite and franklinite were separated from the gangue and used as ore, all other minerals were considered waste and were used as fill in the mine, or left on the "dumps". There is no doubt in the writer's mind that many other new species, and perhaps a few other elements, might have been found in this waste material which escaped the attention of mineral collectors and geologists.

Some of the minerals found in both the metamorphosed limestone and the pegmatite (high temperature granitic solutions forced upward into the limestone) are as follows:

Actinolite	Magnetite
Andradite garnet	Muscovite
Apatite	Quartz
Chalcopyrite	Sphalerite
Fluorite	Spinel
Galena	Titanite

As stated previously, hot igneous solutions contain large amounts of water in the form of superheated steam, volatiles and metallic oxides, all held in solution by high pressures. With the pressure relieved, these solutions, upon cooling, crystallize out, forming pegmatites or hydrothermal veins. These solutions are also called mineralizers. That the hot solutions invading the limestone contained large amounts of silica and water is shown by the eighty silicate minerals found in both the pegmatite and limestone. Further proof that the hot invading solutions contained much water is shown with many silicate minerals containing water of crystallization in amounts up to 27 per cent.

Some of the silicates formed in the hydrothermal veins, and the approximate per centage of water (of crystallization) are as follows:

Mineral	(approx.) % of water	Mineral	(approx.) % of water
Leucophoenicite	2.00	Friedelite	8.00
Pectolite	3.00	Clinohedrite	8.00
Tremolite	3.00	Chloro-phoenicite	11.00
Prehnite	4.00	McGovernite	12.00
Gageite	4.00	Apophyllite	17.00
Hodgkinsonite	5.00	Pyrochroite	20.00
Roeblingite	6.00	Mooreite	27.00
Schallerite	6.00		

Mooreite is a basic hydrous sulfate of magnesium, zinc and manganese. There are no known minerals to which it is closely related. The average of two analyses, by the late Dr. L. H. Bauer, show the following composition:

Magnesium oxide	25.38%
Manganese oxide	11.93
Zinc oxide	24.58
Sulfur trioxide	10.99
Water (H_2O)	27.12
Boric acid	Trace
Silica	Trace

The magnesium, manganese and zinc no doubt were accesions from the nearby ore minerals. The water, surfur, boron and silica evidently were present in the hot intrusive solutions. All these elements combined and crystallized out as Mooreite. As is shown

above, hot ascending solutions are an important factor in the formation of metamorphic minerals. These solutions, with their load of vapors, gases and metallic oxides, together with mineral matter acquired in their journey through the rocks, are aptly called "mineralizers". The finest crystallized specimens from all parts of the world were formed from watery solutions, such as chlorophoenicite, hodgkinsonite, dioptase, wulfenite, crocoite, azurite, to mention a few.

ARE YOU LOOKING FOR SAMPLES OF OLD WOOD? Remnants of an inter-glacial Spruce forest have recently been uncovered in the highway excavation just off the Nicolet Road near Green Bay, Wisconsin. This forest grew some ten or twelve thousand years ago during the period of moderate temperature existing between the Illinoian (3rd) and the Wisconsin (4th) glacial epoc near the close of the Pleistocene or the "Great Ice Age." Several tons of wood was found beneath the later Wisconsin tillate, and it is by means of these interglacial soil deposits that geologists are now able to determine the number, extent and to a degree the duration of the several advances and retreats of the great ice sheets which came down from the North Polar regions to engulf the North Central part of the United States.

* * * *

Book Review

(*Continued from page* 6)

leading financial and commercial personalities were "taken in", and several of the world's foremost authorities on precious jewels unwittingly contributed to the success of the hoax.

In the Great Diamond Hoax, Asbury Harpending, accused by some of being the scamp, rogue, scoundrel and genius by whom the swindle was conceived and elaborated, claims to tell the "whole truth" in his own defense. The result is a story which can be called, without exaggeration, simply fantastic. First published in 1913 it is generally accepted as a truthful narrative. However this great swindle remains surrounded by mystery, inconsistency and controversy.

As unusual as the famous diamond swindle are "the other stirring incidents in the life of Asbury Harpending" which are related in the Great Diamond Hoax. Beginning in 1857, when at the age of 16 he left Kentucky for California, Harpending changed a $5.00 gold coin into a $400 stake, which he mushroomed, after his arrival in San Francisco, into a cash fortune of $250,000 in 1860, before he was twenty years old.

This book is good reading . . . you will not want to lay it down.

(*Continued from page* 21)

Vertebrate paleontology is not an easy branch of the Earth Sciences for an amateur to pursue. If we find a Pierre shale cephalopod, for instance, we can quickly see that it was a shell fish much like a snail. The fossil is usually complete and its story is easily found. However, finding a single fossil tooth with no other clue, is only the beginning of a long and complicated mystery.

In these days the trends are toward becoming great specialists in small sidebranches in Earth Science fields, and while I admit I wouldn't care to specialize in a study of the Mission Fauna, I feel that living where we do I would be amiss in not giving the subject some study, and the above reflect some observations I have made which I should like to pass along to our many dear friends.

(Ed. Note) For Reference and Bibliography consult "The White River Badlands," by C. C. O'Harra, South Dakota School of Mines, 1920. See Figure 48, copied from same.

NEW "MINERALIGHTS, ROCKS AND RAINBOWS" FOLDER TELLS STORY OF FLUORESCENT MINERALS. A helpful, comprehensive "thumbnail review" of fluorescent mineral science and equipment has been issued by Ultra-Violet Products, Inc. The 8 page booklet is available free of charge to hobbyists, prospectors, collectors and educators.

To obtain the free booklet, write Ultra-Violet Products, Inc., San Gabriel, California.

(*Continued from page 7*)

MIAMI VALLEY MINERAL AND GEM CLUB is humming with activity as it prepares for the 1959 Midwest Federation convention which will be held June 18-21 at Springfield, Ohio. Exhibits will be housed in the fairground buildings. In addition to ample parking space on the fairgrounds, there is space for about 30 trailers. One of the features on its program will be a demonstration of arrowhead-making.

NEBRASKA MINERAL AND GEM CLUB plans to have a different program group in charge of each meeting. To make it easier for these groups to plan interesting programs, it has set up a program advisory committee to survey the field of possible program material and to work out procedures for obtaining it.

THE DES PLAINES VALLEY GEOLOGICAL SOCIETY held its Charter Member meeting October 16, 1958, in the Rand Park Field House, Des Plaines, Ill. Their meetings will be the third Thursday of each month at 8:00 P.M. in the same location. There were 78 present at this meeting with 58 joining as Charter Members. The officers elected are: Howard Taylor, Pres.; Robert Simonson, Vice-Pres.; Levi Sherman, 2nd Vice-Pres.; Florence Swan, Rec. Sec.; Edith Schwendemann, Corres. Sec.; Harvey Wartenberg, Treas.; Dorothy Taylor, Publicity. The society expects to affiliate with the Midwest Federation in the near future.

OMAHA MINERALOGICAL SOCIETY: Our good friend Bob Berry, founder and first editor of the EARTH SCIENCE MAGAZINE, reports that a new club has been formed, called the *Omaha Mineralogical Society*. It is a group of junior earth scientists ranging in age from 10 to 18 years. The club will meet once a month. The first meeting was held Oct. 22 at an Omaha church and was well attended. The officers are: Pres., Bill Rushlau; Vice-Pres., Stanley Bach; Secretary, Steve Balliette; Treasurer, Ray Petersen. An early field trip is planned.

OTHER SOCIETIES

MINERALOGICAL SOCIETY OF ARIZONA heard Dr. H. L. Stahnke, of Arizona State University, speak on "Desert Denizens," on November 21. Dr. Stahnke brought scorpions, tarantulas and rattlesnakes to the meeting to illustrate how to be cautious when rock hunting.

GEM CUTTERS GUILD OF BALTIMORE at its December meeting heard John Wise, a past president of the club, speak on "The Principles of Gem Cutting." Afterwards the group participated in polishing gemstones by hand. The Maryland onyx, used for the cabochons, was donated by William Crosby.

OKLAHOMA MINERAL AND GEM SOCIETY reports that Mrs. John Walton sent some Oklahoma rose rocks to a correspondent in Africa and received in exchange a packet containing some fine emerald crystal specimens. The largest specimen, a perfect crystal of excellent color, weighs 325.92 grams (1,629.6 carats). This exceeds in size the rather famous Devonshire emerald crystal specimen in the British Museum, which weighs 1,383.95 carats. Mrs. Walton's crystal has been appraised at $1.00 per gram.

PHOENIX GEM AND MINERAL SHOW, sponsored by the Mineralogical Society of Arizona, Maricopa Lapidary Society, and Aire-search Lapidary Club, will be held February 27 through March 1 at the Arizona State Fairgrounds, Phoenix, Arizona. The theme of the show is Jade. Jades from the following collections will be shown: Walker Collection, Minneapolis; Nelson Art Gallery, Kansas City; Loughlin's Wyoming Jade, and a privately owned collection of Oriental jade from California.

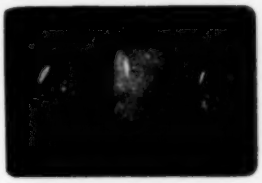
RECOMMENDED READINGS

"STORY OF MONTANA AGATE," by Charles and Gen Kruger, November issue of *The Rear Trunk*. A scientific explanation of how the patterns that closely resemble designs on a frosty window were formed in Montana's lovely dendritic agate.

"A Dirty Story," by Ray Lulling, November issue of *Rock Rustlers News*. Mud from a slabbing saw can be turned into fuel, polishing powder and diamond dust by following Mr. Lulling's simple instructions.

"Weathering," by Dr. Virgil Slight, November issue of *Chips and Facets*. Weathering may beautify or discolor a specimen, it may free a specimen from its matrix or destroy the specimen and leave the matrix. This article tells how the effects of weathering are brought about.

"Closing Quarries," by Kenneth Elwell, November issue of *Conglomerate*. Quarries all over the country are being closed to collectors at an alarming rate. Mr. Elwell relates offenses by rockhounds that have led to the closing of many quarries and gives some sound advice on what to do and what not to do when visiting a quarry. A must for every rockhound who is concerned about the dwindling number of collecting sites.



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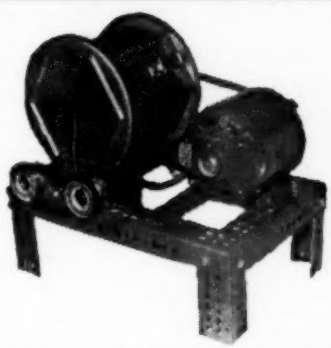

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ADVERTISER'S INDEX

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Rate: Eight Cents per word, per issue. Minimum $2.00, payable in advance. No proofs or copies for checking are furnished. Introductory words will appear in CAPITALS. When additional capitalization is required, each such word counts as two words. No charge for name and address.

CULTURED PEARLS are amazingly beautiful if they have a real pinkish sheen and are set in the right fittings. Our large 6mm pearls are ground on one end for easy cementing. The slightly cupped fittings are double filligrees, very pretty. Simply cement a pearl in the fitting and you are done. Order a sample pair of two filigree ear bobs and two matched pearls for $1.50. Pearls and fittings list included. At the same time you could order one of our new flat bracelets with six large ovals and six white southseas catseyes for $1.50. Cement a catseye to each oval. Both above sets make gifts that are different. 10% tax if not for resale. M. W. AVERY, 332 Columbia Blvd., Wood-Ridge, N. J.

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SMOKY MOUNTAIN SPECIMENS. Cabinet display grade of ruby in smaragdite, Calamites, Lepidodendrons, Geodes, Zoisite. 25c brings list and two sapphires. OLE ROCKHOUND MUSEUM, 422 Ohio, Etowah, Tennessee.

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ROCKHOUND "COLLECTORS"! contact us for the rare, choice, select, odd and unusual. Gemstones, minerals, carvings, fossils, artifacts, relics, etc. Open days and evenings. Visitors always welcome anytime. THE COLE'S, 551 S. W. Coast Highway, Newport, Oregon.

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QUARTZ CRYSTALS ON MATRIX. A collector's dream. Sparkling crystals formed over 300 million years ago in Ordovician rocks of Columbia County, New York. Crystals vary in length from ½" to 1½". Specimens on matrix, 2" x 2", $1.50; 2" x 3", $2.25; 3" x 4", $4.24; 3" x 8" to 4" x 7", $7.50. Museum pieces, 8" x 12" and larger, $10.00. Assorted small individual crystals, 12 for $1.00. All items shipped postpaid. HALLENBECK'S MINERAL SHOP, Eichybush Rd., Kinderhook, New York.

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INDEX: Volumes 6-10 (1952-1957).*

*The 3 numbers, separated by commas, following each item in the Index refer to volume, issue, and page, respectively. Monthly (or bi-monthly) designation, plus year, are also shown. Volume 6 comprises July 1952 through June 1953; Volume 7 July 1953 through December 1954; and Volumes 8, 9, and 10 the calendar years of 1955, 1956, and 1957.

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REMEMBER! February 5th will be the deadline for all new ads for the April issue. DEADLINE for REPEAT ads and NEW PLATES will be February 12th.

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INDEX: Volumes 6-10 (1952-1957).*

*The 3 numbers, separated by commas, following each item in the Index refer to volume, issue, and page, respectively. Monthly (or bi-monthly) designation, plus year, are also shown. Volume 6 comprises July 1952 through June 1953; Volume 7 July 1953 through December 1954; and Volumes 8, 9, and 10 the calendar years of 1955, 1956, and 1957.

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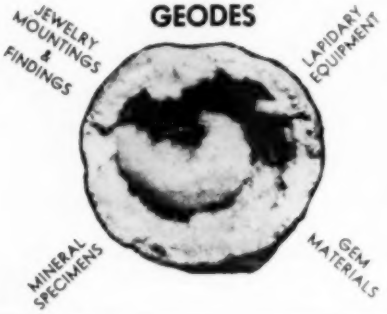

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